IN THE CLAIMS:

Rewrite the pending claims as follows:

1. (Currently Amended) In a system for navigating an object based on code and carrier-phase measurements obtained using signals on a first frequency and signals on a second frequency from a plurality of satellites, a method for continuing dual-frequency navigation during a time period in which signals from a respective satellite on the first frequency are lost, the method comprising:

performing dual-frequency navigation before the time period, including computing smoothed code measurements and ~~corrections~~ updates to an ionospheric model based on code and carrier-phase measurements obtained using signals from the respective satellite on both the first and second frequencies;

performing backup navigation during the time period by synthesizing a carrier-phase measurement on the first frequency from a carrier-phase measurement on the second frequency and from the ~~corrections~~ updates to the ionospheric model computed prior to the time period; and

transitioning to dual-frequency navigation using signals from the respective satellite on both the first and second frequencies in response to resumption of receiving signals from the respective satellite on the first frequency.

2. (Original) The method of claim 1 wherein computing the smoothed code measurements comprises:

smoothing a code measurement with a combination of carrier-phase measurements, the combination having an ionospheric delay that matches an ionospheric delay in the code measurement.

3. (Original) The method of claim 1 wherein performing dual-frequency navigation further comprises:

obtaining a modeled ionospheric bias term computed using the ionospheric model;

computing a measured ionospheric bias term using the smoothed code measurements; and

computing a correction to the modeled ionospheric bias term by taking a difference between the measured and modeled ionospheric bias terms.

4. (Original) The method of claim 3 wherein performing dual-frequency navigation further comprises:

obtaining a modeled ionospheric rate term computed using the ionospheric model;

computing a measured ionospheric rate term using differences of carrier-phase measurements between two measurement epochs; and

computing a correction to the modeled ionospheric rate term by taking a difference between the measured and modeled ionospheric rate terms.

5. (Currently Amended) The method of claim 1 wherein performing backup navigation further comprises:

obtaining a modeled ionospheric bias term computed using the ionospheric model;

computing an estimated ionospheric bias term using the modeled ionospheric bias term and the ~~corrections~~ updates to the ionospheric model computed before the time period;

computing the synthesized carrier-phase measurement on the first frequency using the estimated ionospheric bias term and the carrier-phase measurement on the second frequency.

6. (Original) The method of claim 1 wherein performing backup navigation further comprises computing estimated smoothed code measurements on both the first and second frequencies using the synthesized carrier-phase measurement on the first frequency, the carrier-phase measurement on the second frequency, and computation results obtained based on signals from the respective satellite on both the first and second frequencies received at the object before the time period.

7. (Currently Amended) The method of claim 6 wherein performing backup navigation further comprises computing ~~updated~~ further ~~corrections~~ updates to the ionospheric model based on the ~~corrections~~ updates to the ionospheric model computed prior to the time period, the estimated smoothed code measurement on the second frequency, and a code measurement obtained using signals on the second frequency.

8. (Original) The method of claim 1 wherein transitioning to dual-frequency navigation comprises:

determining whether the time period exceeds a predetermined threshold;

in response to a determination that the time period does not exceed a predetermined threshold, determining whether a difference between a measured carrier-phase range and a

synthesized carrier-phase range corresponding to the first frequency is sufficiently close to an integer number of the wavelength corresponding to the first frequency; and

in response to a determination that the difference between the measured carrier-phase range and the synthesized carrier-phase range is sufficiently close to an integer number of the wavelength, adjusting an estimated ambiguity value associated with the measured carrier-phase measurement or adjusting an estimated offset between a code measurement on the first frequency and a carrier-phase combination having an ionospheric delay that matches the ionospheric delay in the code measurement.

9. (Currently Amended) In a system for navigating an object based on code and carrier-phase measurements obtained using signals from a plurality of satellites, a method for performing backup dual-frequency navigation when signals on one of two frequencies from one or more satellites are unavailable, comprising:

for each satellite from which signals on one of two frequencies are unavailable, generating a synthesized carrier-phase measurement on the one of the two frequencies that is unavailable from a measured carrier-phase measurement obtained using signals from the respective satellite on another one of the two frequencies, and from a first set of computation results obtained with respect to the respective satellite during steady-state processing when signals on both of the two frequencies were available from the respective satellite, and wherein the first set of computation results ~~include~~ includes ~~corrections~~ updates to an ionospheric model; and

generating smoothed code measurements on the two frequencies from the measured carrier-phase measurement, the synthesized carrier-phase measurement, and a second set of computation results obtained during steady-state processing when signals on both of the two frequencies were available from the respective satellite.

10. (Canceled).

11. (Currently Amended) The method of claim 9, further comprising:

~~updating~~ revising the ~~corrections~~ updates to the ionospheric model.

12. (Currently Amended) The method of claim 10 wherein the ~~corrections~~ updates to the ionospheric model include an ionospheric bias term and an ionospheric rate term.

13. (Currently Amended) The method of claim 10 wherein the first set of computation results ~~include~~ includes those computed from smoothed code measurements.

14. (Original) The method of claim 13 wherein the smoothed code measurements are computed by forming combinations of carrier-phase measurements each having an ionospheric delay that matches an ionospheric delay in a corresponding code measurement, and by smoothing the code measurement with the corresponding combination of carrier-phase measurements to remove multipath errors in the code measurement.

15. (Currently Amended) The method of claim 14 wherein the first set of computation results ~~include~~ includes those computed from smoothed offsets each between a smoothed code measurement and a carrier-phase combination corresponding to the code measurement.

16. (Currently Amended) The method of claim 15 wherein the second set of computation results ~~include~~ includes the smoothed offsets.

17. (Currently Amended) For use in [[In]] a system for navigating an object based on code and carrier-phase measurements obtained using signals on a first frequency and signals on a second frequency from a plurality of satellites, a computer readable medium storing therein computer readable instructions that when executed by a computer perform[[s]] a method for continuing dual-frequency navigation during a time period in which signals from a respective satellite on the first frequency are lost, the instructions comprising:

instructions for performing dual-frequency navigation before the time period by computing smoothed code measurements and ~~corrections~~ updates to an ionospheric model based on code and carrier-phase measurements obtained using signals from the respective satellite on both the first and second frequencies before the time period;

instructions for performing backup navigation during the time period by synthesizing a carrier-phase measurement on the first frequency from a carrier-phase measurement on the second frequency and from the ~~corrections~~ updates to the ionospheric model computed prior to the time period; and

instructions for transitioning to dual-frequency navigation using signals from the respective satellite on both the first and second frequencies in response to resumption of receiving signals from the respective satellite on the first frequency.

18. (Currently amended) The computer readable medium of claim 17 wherein the instructions for ~~performing dual-frequency navigation~~ computing the smoothed code measurements ~~further~~ comprise[[s]]:

instructions for smoothing a code measurement with a combination of carrier-phase measurements to form a smoothed code measurement, the combination having [[a]] an ionospheric delay that matches an ionospheric delay in the code measurement~~; and~~

~~instructions for computing a correction to a modeled ionospheric bias term~~.

19. (Currently Amended) The computer readable medium of claim 17 wherein the instructions for performing backup navigation further comprise[[s]]:

instructions for obtaining a modeled ionospheric bias term;

instructions for computing an estimated ionospheric bias term using the modeled ionospheric bias term and the ~~corrections~~ updates to the ionospheric model computed before the time period; and

instructions for computing the synthesized carrier-phase measurement on the first frequency using the estimated ionospheric bias term and the carrier-phase measurement obtained using signals on the second frequency.

20. (Currently amended) The computer readable medium of claim 17 wherein the instructions for transitioning to dual-frequency navigation comprise[[s]]:

instructions for determining whether the time period exceeds a predetermined threshold;

instructions for determining, in response to a determination that the time period does not exceed a predetermined threshold, whether a difference between a measured carrier-phase range and a synthesized carrier-phase range corresponding to the first frequency is sufficiently close to an integer number of the wavelength corresponding to the first frequency; and

instructions for adjusting, in response to a determination that the difference between the measured carrier-phase range and the synthesized carrier-phase range is sufficiently close to an integer number of the wavelength, an estimated ambiguity value associated with the measured carrier-phase measurement or an estimated offset between a code measurement on the first frequency and a carrier-phase combination having an ionospheric delay that matches the ionospheric delay in the code measurement.

21. (New) The computer readable medium of claim 17 wherein the instructions for performing dual-frequency navigation further comprise:

instructions for obtaining a modeled ionospheric bias term computed using the ionospheric model;

instructions for computing a measured ionospheric bias term using the smoothed code measurements; and

instructions for computing a correction to the modeled ionospheric bias term by taking a difference between the measured and modeled ionospheric bias terms.

22. (New) The computer readable medium of claim 21 wherein the instructions for performing dual-frequency navigation further comprise:

instructions for obtaining a modeled ionospheric rate term computed using the ionospheric model;

instructions for computing a measured ionospheric rate term using differences of carrier-phase measurements between two measurement epochs; and

instructions for computing a correction to the modeled ionospheric rate term by taking a difference between the measured and modeled ionospheric rate terms.

23. (New) The computer readable medium of claim 17 wherein the instructions for performing backup navigation further comprise instructions for computing estimated smoothed code measurements on both the first and second frequencies using the synthesized carrier-phase measurement on the first frequency, the carrier-phase measurement on the second frequency, and computation results obtained based on signals from the respective satellite on both the first and second frequencies received at the object before the time period.

24. (New) The computer readable medium of claim 23 wherein the instructions for performing backup navigation further comprise instructions for computing further updates to the ionospheric model based on the updates to the ionospheric model computed prior to the time period, the estimated smoothed code measurement on the second frequency, and a code measurement obtained using signals on the second frequency.

25. (New) A system for navigating an object, comprising:

a receiver to produce code and carrier-phase measurements in accordance with signals received on a first frequency and signals received on a second frequency from a plurality of satellites;

one or more processors; and

one or more programs executable by the one or more processors, the one or more programs including:

instructions for performing dual-frequency navigation, before a time period in which signals from a respective satellite on the first frequency are lost, by computing smoothed code measurements and updates to an ionospheric model based on code and carrier-phase measurements obtained using signals from the respective satellite on both the first and second frequencies before the time period;

instructions for performing backup navigation during the time period by synthesizing a carrier-phase measurement on the first frequency from a carrier-phase measurement on the second frequency and from the updates to the ionospheric model computed prior to the time period; and

instructions for transitioning to dual-frequency navigation using signals from the respective satellite on both the first and second frequencies in response to resumption of receiving signals from the respective satellite on the first frequency.

26. (New) The system of claim 25 wherein the instructions for computing the smoothed code measurements comprise:

instructions for smoothing a code measurement with a combination of carrier-phase measurements, the combination having an ionospheric delay that matches an ionospheric delay in the code measurement.

27. (New) The system of claim 25 wherein the instructions for performing dual-frequency navigation further comprise:

instructions for obtaining a modeled ionospheric bias term computed using the ionospheric model;

instructions for computing a measured ionospheric bias term using the smoothed code measurements; and

instructions for computing a correction to the modeled ionospheric bias term by taking a difference between the measured and modeled ionospheric bias terms.

28. (New) The system of claim 27 wherein the instructions for performing dual-frequency navigation further comprise:

instructions for obtaining a modeled ionospheric rate term computed using the ionospheric model;

instructions for computing a measured ionospheric rate term using differences of carrier-phase measurements between two measurement epochs; and

instructions for computing a correction to the modeled ionospheric rate term by taking a difference between the measured and modeled ionospheric rate terms.

29. (New) The system of claim 25 wherein the instructions for performing backup navigation further comprise:

instructions for obtaining a modeled ionospheric bias term computed using the ionospheric model;

instructions for computing an estimated ionospheric bias term using the modeled ionospheric bias term and the updates to the ionospheric model computed before the time period; and

instructions for computing the synthesized carrier-phase measurement on the first frequency using the estimated ionospheric bias term and the carrier-phase measurement on the second frequency.

30. (New) The system of claim 25 wherein the instructions for performing backup navigation further comprise instructions for computing estimated smoothed code measurements on both the first and second frequencies using the synthesized carrier-phase measurement on the first frequency, the carrier-phase measurement on the second frequency, and computation results obtained based on signals from the respective satellite on both the first and second frequencies received at the object before the time period.

31. (New) The system of claim 30 wherein the instructions for performing backup navigation further comprise instructions for computing further updates to the ionospheric model based on the updates to the ionospheric model computed prior to the time period, the estimated smoothed code measurement on the second frequency, and a code measurement obtained using signals on the second frequency.

32. (New) The system of claim 25 wherein the instructions for transitioning to dual-frequency navigation comprise:

instructions for determining whether the time period exceeds a predetermined threshold;

instructions for determining, in response to a determination that the time period does not exceed a predetermined threshold, whether a difference between a measured carrier-phase range and a synthesized carrier-phase range corresponding to the first frequency is

sufficiently close to an integer number of the wavelength corresponding to the first frequency; and

instructions for adjusting, in response to a determination that the difference between the measured carrier-phase range and the synthesized carrier-phase range is sufficiently close to an integer number of the wavelength, an estimated ambiguity value associated with the measured carrier-phase measurement or an estimated offset between a code measurement on the first frequency and a carrier-phase combination having an ionospheric delay that matches the ionospheric delay in the code measurement.